CORMIX SESSION REPORT:
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CORMIX MIXING ZONE EXPERT SYSTEM
CORMIX Version 8.0G
HYDRO1:Version-8.0.0.0 April,2012

SITE NAME/LABEL: LOOP LLC
DESIGN CASE: Rerun old parameters
FILE NAME: C:\Users\tshaikh\Documents\Louisiana Permitting\LA0049492\LA0049492.prd
Using subsystem CORMIX1: Single Port Discharges
Start of session: 03/24/2014--08:47:50

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SUMMARY OF INPUT DATA:

AMBIENT PARAMETERS:

Cross-section		= unbounded
Average depth	HA	= 37 m
Depth at discharge	HD	= 37 m
Ambient velocity	UA	= 0.04 m/s
Darcy-Weisbach friction factor	F	= 0.0094
Calculated from Manning's n		= 0.02
Wind velocity	UW	= 4 m/s
Stratification Type	STRCND	= U
Surface density	RHOAS	= 1020 kg/m^3
Bottom density	RHOAB	= 1020 kg/m^3

DISCHARGE PARAMETERS: Single Port Discharge

Nearest bank		= left
Distance to bank	DISTB	= 25000 m
Port diameter	D0	= 0.254 m
Port cross-sectional area	A0	= 0.0507 m^2
Discharge velocity	U0	= 3.74 m/s
Discharge flowrate	Q0	= 0.189509 m^3/s
Discharge port height	H0	= 12.20 m
Vertical discharge angle	THETA	= 90 deg
Horizontal discharge angle	SIGMA	= 0 deg
Discharge density	RHO0	= 1006.91 kg/m^3
Density difference	DRHO	= 13.0900 kg/m^3
Buoyant acceleration	GP0	= 0.1259 m/s^2
Discharge concentration	C0	= 0.5 mg/l
Surface heat exchange coeff.	KS	= 0 m/s
Coefficient of decay	KD	= 0 /s

DISCHARGE/ENVIRONMENT LENGTH SCALES:

LQ = 0.23 m	Lm = 21.05 m	Lb = 372.66 m
LM = 5.00 m	Lm' = 99999 m	Lb' = 99999 m

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NON-DIMENSIONAL PARAMETERS:
  Port densimetric Froude number  FRO     = 20.92
  Velocity ratio                  R       = 93.50
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MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                                 = yes
  CMC concentration                 CMC           = 0.013 mg/l
  CCC concentration                 CCC           = 0.0075 mg/l
  Water quality standard specified                = given by CCC value
  Regulatory mixing zone                          = yes
  Regulatory mixing zone specification            = distance
  Regulatory mixing zone value                    = 30.48 m (m^2 if area)
  Region of interest                              = 50000 m
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HYDRODYNAMIC CLASSIFICATION:
  *-------------------------*
  | FLOW CLASS    = V5 |
  *-------------------------*
  This flow configuration applies to a layer corresponding to the
full water
  depth at the discharge site.
  Applicable layer depth = water depth = 37 m
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MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

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X-Y-Z Coordinate system:
  Origin is located at the bottom below the port center:
    25000 m from the left bank/shore.
  Number of display steps NSTEP = 20 per module.
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NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing.  It has no
regulatory
  implication.  However, this information may be useful for the
discharge
  designer because the mixing in the NFR is usually sensitive to
the
  discharge design conditions.
  Pollutant concentration at NFR edge  c = 0.0087 mg/l
  Dilution at edge of NFR              s = 57.7
  NFR Location:                        x = 88.97 m
    (centerline coordinates)           y = 0 m
                                       z = 37 m
  NFR plume dimensions:  half-width (bh) = 173.06 m
                         thickness (bv) = 0.79 m
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Cumulative travel time: 2191.6418 sec.

Buoyancy assessment:
The effluent density is less than the surrounding ambient water density at the discharge level.
Therefore, the effluent is POSITIVELY BUOYANT and will tend to rise towards
the surface.

UPSTREAM INTRUSION SUMMARY:
Plume exhibits upstream intrusion due to low ambient velocity or strong
discharge buoyancy.

Intrusion length	=	122.13 m
Intrusion stagnation point	=	-119.68 m
Intrusion thickness	=	0.73 m
Intrusion half width at impingement	=	173.06 m
Intrusion half thickness at impingement	=	0.79 m

FAR-FIELD MIXING SUMMARY:
Plume becomes vertically fully mixed at 13992.82 m downstream.

PLUME BANK CONTACT SUMMARY:
Plume in unbounded section contacts nearest bank at 29450.62 m downstream.

********** TOXIC DILUTION ZONE SUMMARY **********

Recall: The TDZ corresponds to the three (3) criteria issued in the USEPA
Technical Support Document (TSD) for Water Quality-based Toxics Control,
1991 (EPA/505/2-90-001).

Criterion maximum concentration (CMC) = 0.013 mg/l
Corresponding dilution = 38.461538
The CMC was encountered at the following plume position:

Plume location: (centerline coordinates)	x =	29.68 m
	y =	0 m
	z =	37 m
Plume dimension: half-width (bh)	=	146.39 m
thickness (bv)	=	0.75 m

Computed distance from port opening to CMC location = 38.67 m.
CRITERION 1: This location is beyond 50 times the discharge length scale of
Lq = 0.23 m.
+++++ The discharge length scale TEST for the TDZ has FAILED. ++++++

Computed horizontal distance from port opening to CMC location = 29.68 m.
CRITERION 2: This location is within 5 times the ambient water depth of
HD = 37 m.
++++++++++ The ambient depth TEST for the TDZ has been SATISFIED. ++++++++++

Computed distance from port opening to CMC location = 38.67 m.
CRITERION 3: This location is beyond one tenth the distance of the extent
of the Regulatory Mixing Zone of 39.29 m in any spatial direction from the port opening.
+++++ The Regulatory Mixing Zone TEST for the TDZ has FAILED. ++++++

The diffuser discharge velocity is equal to 3.74 m/s.
This exceeds the value of 3.0 m/s recommended in the TSD.

*** This discharge DOES NOT SATISFY all three CMC criteria for the TDZ. ****
********** REGULATORY MIXING ZONE SUMMARY **********
The plume conditions at the boundary of the specified RMZ are as follows:

Pollutant concentration	c = 0.012883	mg/l
Corresponding dilution	s = 39.1	
Plume location:	x = 30.48 m	
(centerline coordinates)	y = 0 m	
	z = 37 m	
Plume dimensions: half-width (bh)	= 146.77 m	
thickness (bv)	= 0.75 m	

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Cumulative travel time < 2191.6418 sec. (RMZ is within NFR)

Note:
Plume concentration c and dilution s values are reported based on prediction
file values - assuming linear interpolation between predicted points just
before and just after the RMZ boundary has been detected.

Please ensure a small step size is used in the prediction file to account
for this linear interpolation. Step size can be controlled by increasing
(reduces the prediction step size) or decreasing (increases the prediction
step size) the - Output Steps per Module - in CORMIX input.

At this position, the plume is NOT IN CONTACT with any bank.
However, the CCC for the toxic pollutant has not been met within the RMZ.

In particular:
The CCC was encountered at the following plume position:
The CCC for the toxic pollutant was encountered at the following plume position:

CCC	= 0.0075	mg/l
Corresponding dilution	= 66.7	
Plume location:	x = 195.18	m
(centerline coordinates)	y = 0	m
	z = 37	m
Plume dimensions: half-width (bh)	= 238.42	m
thickness (bv)	= 0.66	m

Regulatory Mixing Zone Analysis:
The RMZ specification occurs before the near-field mixing regime (NFR) has been completed. The specification of the RMZ is highly restrictive.

********** FINAL DESIGN ADVICE AND COMMENTS **********

REMINDER: The user must take note that HYDRODYNAMIC MODELING by any known technique is NOT AN EXACT SCIENCE.
Extensive comparison with field and laboratory data has shown that the CORMIX predictions on dilutions and concentrations (with associated plume geometries) are reliable for the majority of cases and are accurate to within about +-50% (standard deviation).
As a further safeguard, CORMIX will not give predictions whenever it judges the design configuration as highly complex and uncertain for prediction.